

VERIFICATIONS.

Indications.—The detailed comparison of the tri-daily indications for September, with the telegraphic reports for the succeeding twenty-four hours, shows the general percentage of verifications to be 85.1 per cent. The percentages for the four elements are: Weather, 85.8; Direction of the Wind, 84.1; Temperature, 86.4; Barometer, 84.0 per cent. By geographical districts they are: for New England, 83.4; Middle States, 86.3; South Atlantic States, 86.9; Eastern Gulf States, 80.8; Western Gulf States, 88.0; Lower Lake region, 86.1; Upper Lake region, 85.6; Tennessee and the Ohio valley, 85.6; Upper Mississippi valley, 83.6; Lower Missouri valley, 82.8; Northern Pacific coast region, 80.6; Central Pacific coast region, 96.6; Southern Pacific coast region, 100.0. There were 23 omissions to predict out of 3,690, or 0.62 per cent. Of the 3,667 predictions that have been made, 99, or 2.70 per cent. are considered to have entirely failed; 135, or 3.68 per cent. were one-fourth verified; 459, or 12.52 per cent. were one-half verified; 467, or 12.73 per cent. were three-fourths verified; 2,507, or 68.37 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

Cautionary Signals.—94 Cautionary Signals were displayed during the month, of which 73, or 77.7 per cent., were justified by winds of 25 miles per hour or over at, or within a radius of 100 miles of, the station. 28 Off-shore Signals were displayed, of which 22 or 78.5 per cent. were fully justified, and 27 or 96.4 per cent. justified as to direction. Seven of the Off-Shore were changed from Cautionary. 122 Signals of both kinds were displayed, of which 95 or 77.9 per cent. were fully justified. 76 cases of winds of 25 miles and over per hour, from scattered stations, were reported, for which signals had not been ordered. The above does not include signals ordered for 49 display stations, where the velocity is only estimated. Fourteen signals were ordered late.

NAVIGATION.

In the table on the right-hand side of chart No. III are given the highest and lowest stages of water, as recorded on the Signal Service river gauges, during September, 1880. The *Mississippi* above the mouth of the Missouri fell steadily to the 18th, after which date a rise occurred at Davenport and Keokuk, but above the former station the fall continued till near the end of the month. From St. Louis to Vicksburg in the early part of the month a rise prevailed, ending on the 10th at the former station and on the 19th at the latter. This rise was followed by a steady fall to the 30th. At New Orleans the river fell to the 19th and then rose to the 30th. Excepting very slight rises in the early part, the *Missouri* fell steadily throughout the month, except at Yankton where it rose one inch during the 29th. The *Tennessee* at Chattanooga remained nearly stationary with a falling tendency until the 25th, when it was at its lowest point, 1 ft. 11 in.; it then rose steadily to 4 ft. on the 30th. On the 22nd all but the smallest steamers stopped running. The *Ohio* remained at a low stage of water during the month, the steady fall from the 1st being broken only by slight rises which reached their highest point at Pittsburgh, on the 13th, 4 ft. 1 in., and at Cincinnati on the 15th, 9 ft. 2 in. Excepting a slight rise on the 27th and 28th the *Red River* at Shreveport fell steadily throughout the month. The *Arkansas* at Little Rock fell from the 5th to the 30th. The *Cumberland* at Nashville was at its highest point on the 7th, after which, except a slight rise on the 27th, it fell steadily. At Morgantown the *Monongahela* fell till the 27th, when it stood at 4 ft. 5 in.; by the 29th it had risen to 8 ft. 9 in.; on the 26th the river fell to 3 in. below low water mark owing to the opening of the locks below.

High Tides.—Ft. Macon, N. C., 20th, very high; Portsmouth, N. C., 19th.

Low Tides.—Cedar Keys, Fla., 24th, 27th.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service Stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart No. II. At the following stations observations were not made on the dates indicated: Charleston, 3rd to 11th, inclusive; Key West, 1st to 8th; Milwaukee, 21st to 30th; Mobile, 21st to 26th.

ATMOSPHERIC ELECTRICITY.

Thunder storms have occurred with the greatest frequency as follows: *Illinois*: 3rd, 18th and 19th. *Indiana*: 3rd, 5th, 6th, 15th, 18th, 25th. *Iowa*: 3rd, 6th, 19th, 25th. *Kansas*: 3rd, 18th, 25th. *Michigan*: 1st, 19th. *Nebraska*: 6th, 18th, 25th. *Missouri*: 19th. *New York*: 4th. *Ohio*: 4th, 28th. *Virginia*: 5th and 6th. *Tennessee*: 4th, 5th. *Texas*: 3rd, 4th, 6th, 7th, 12th, 22nd to 26th. In other States they have occurred with comparative infrequency. At Santa Barbara, Cal., a thunder-storm occurred the 7th.

Atmospheric Electricity Interfering with Telegraph Lines.—*New Mexico*—Silver City, on the 9th, 10th, 21st; Santa Fe, 6th, 26th; Socorro, 12th, 16th, 20th, 26th, 28th, 29th; La Mesilla, 10th, 20th.

Zodiacal Light.—*Indiana*: New Corydon, 4th, 5th, 8th, 9th, 10th, 11th, 14th, 15th. *Iowa*: Yates Centre, 27th. *Minnesota*: St. Vincent, 26th, 30th. *Tennessee*: Nashville, 14th, 2 a. m.; 15th, 2:30 a. m.; 16th, 2 a. m.; 24th, 6:50 p. m.; 28th, 9 p. m. The following is a brief summary of observations on the zodiacal light, by Mr. Chas. Hasselbrink, at Havana, which have been received

since the publication of the July REVIEW: July 2nd, visible between the clouds. 3rd and 4th, visible after 8 p. m., intermittence sensible. 5th, visible after 9 p. m., intermittence seldom. 6th, visible at 8:30 p. m., with a constant uniform glare, no intermittence. 7th, 8 p. m., of little azimuthal extension and strongly inclined to south, shaded away on the north side, while on the south, the limit was sharply defined, light uniform, without intermittence; at 9:30 p. m., indifferent glare. 9th, 8:15 p. m., not very bright and no sensible intermittence. August 23rd, 7:45 p. m., visible, sensible intermittence, extraordinary inclination towards the south, little intensity, more a whitish glare than a yellow-reddish color. 24th, visible at 7:40 p. m.; 8:15 p. m., first intermittence, of long duration; inclination S. about 60 degrees. 25th, visible at 7:30 p. m.; 7:35 p. m., very sensible intermittence, almost to complete disappearance for about five minutes; inclination S. about 60 degrees. (Note.—“The luminous pyramid is subject to, or agitated by, strange, capricious, irregular movements, which either dart or shoot right through it, or commence on either side and invade it slowly and generally, producing in all cases a change in the appearance of the light.”) 26th, just visible. 27th, visible from 7:25 to 9:15 p. m.; 7:30 p. m., of great extension and of uniform warm color. (Note.—“Before the completion of the intermittences there is frequently a transitory aspect—the whole field of light appearing *spotted*.”) August 28th to September 5th, obscured. September 6th, 7:20 p. m., visible, several intermittences, very indifferent glare. 7th, visible, several intermittences, some to complete disappearance; 21st, visible, no intermittence, inclination to S. about 45 degrees. 22nd, visible at 7 p. m., little intensity, of whitish, yellowish tint, 10 to 12 intermittences noted—some of complete disappearance; inclination to S. about 45 degrees. 23rd, visible near horizon. 24th, visible; 25th, visible, not very intense, of great extension but no defined shape. 26th, same as yesterday. 27th and 28th, visible. 29th, visible at 7:15 p. m., extraordinary brightness and a warm tint not noted for months previously; of great extension, all of the stars of Bootes drowned in the light; inclination to S. about 45 degrees. October 1st, visible for a while, of good intensity and warm tint.

Auroras were nightly observed, from the 27th to the 30th, inclusive, over a wide extent of country, from Maine westward to Dakota, and as far south as latitude 40°. They were visible as far west as Fort Buford on the 27th, 28th, 29th, and at Bismarck on 30th. To the eastward they were observed as far as Grafton, N. H., on 27th, Bangor, 29th, and Gardiner, Me., 28th to 30th. The most southerly stations reporting on these four dates were St. Louis, Mo., and Clear Creek, Neb., 27th; Jacksonburg, Ohio, 28th; Newport, R. I., 28th and 29th, and New Haven, Conn., 30th. The displays were remarkable at no station. The colors were variously reported as white, red, yellow, pale yellow and dark emerald. The general characteristics were few or no luminous beams, dark segment, and arch of slight altitude. An aurora was observed on the morning of the 1st at New Corydon, Ind., and Atlantic City, N. J., and that evening at Bangor and Eastport, Me., Burlington, Vt., St. Vincent, Minn., and Yankton, Dak. On the morning of the 14th auroras were seen at Rochester, N. Y., and Woodstock, Vt., and in the evening at Waterburg, N. Y., Port Huron, Mich., Fort Buford, D. T., and St. Vincent, Minn. Displays observed only at one or two stations occurred as follows: St. Vincent, Minn., 4th, 6th, 8th, 25th, 26th; Bangor, Me., 2nd; South Lee, Mass., 5th; Clear Creek, Neb., 11th, 19th, 27th; Wooster, Ohio, 20th; Cincinnati, Ohio, and Woodstock, Md., 20th; New London, Conn., 24th; Yates Centre, Kan., 26th; the latter station was the most southerly at which a display was observed during the month.

MISCELLANEOUS PHENOMENA.

Butterflies.—St. Louis, 21st, many flying south were seen in the streets.

Prairie Fires.—Breckenridge, Minn., south of station, on the 27th, 28th.

Locusts.—Cresswell, Kan., flying south on the 7th, 11th, 12th, 19th, 28th; Jacksboro, Tex., 27th, moving south.

Trees in Bloom.—Logansport, Ind., on the 11th and Ashwood, Tenn., 20th, cherry trees in bloom for the second time this year.

Solar and Lunar Halos have been observed in considerable numbers but none of special interest have been reported. A lunar rainbow was observed at Key West on the 20th.

Volcano.—Capt. Smith, of the steamer *Josephine*, who arrived at Seattle, Wash. T., reports that while ascending the Skagit river on September 7th, when opposite Mount Baker, he observed that mountain in a state of violent eruption, flames streaming up from the summit, and large volumes of smoke ascending.

Sunsets.—The characteristics of the sky at sunset as indicative of fair or foul weather for the succeeding twenty-four hours have been observed at all Signal Service Stations. Reports from 137 stations show 4,088 observations to have been made, of which 23 were reported doubtful; of the remainder, 4,065 or 83.8 per cent. were followed by the expected weather.

Earthquakes.—Salt Lake City, Utah, 16th, 10:27 p. m., lasting 15 seconds; movement from SW. to NE.; shock reported to have been felt in various parts of the Territory. Charlotte, Vt., 23rd, about 6 p. m., lasting one minute. Los Angeles, Cal., 26th, 5:40 p. m., lasting about 3 seconds, horizontal movement from W. to E. Ft. Douglass, Utah, 16th, slight shock at midnight.